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with --CF<sub>4</sub>--, --N<sub>2</sub>--, and --Ar--, respectively. These proposed changes are indicated in red on the attached copy of the originally filed drawings.

Upon approval of the proposed changes, Applicants respectfully request that the Examiner accept three (3) sheets of formal drawings (Figs. 1-3) also submitted herewith. The formal drawings reflect the changes to Fig. 1 proposed in the Request for Approval of Drawing Change.

**REMARKS**

By this Amendment, Applicants have canceled claims 6 and 12 without prejudice or disclaimer of the subject matter thereof; amended claims 1 and 7; and added new claims 13-16. Accordingly, claims 1-5, 7-11, and 13-16 are currently pending in the application. Claims 1 and 7 are independent claims.

The Examiner objected to the drawings and specification for informalities. See Office Action, page 2. In response, Applicants have amended the specification to delete the references to the claim numbers. In addition, Applicants submit a Request for Approval of Drawing Change, proposing to replace "N<sub>2</sub>," "H<sub>2</sub>," and "CF<sub>4</sub>" in Fig. 1 with --CF<sub>4</sub>--, --N<sub>2</sub>--, and --Ar--, respectively. These proposed changes to Fig. 1 make the drawings consistent with the disclosure in the specification.

Accordingly, Applicants respectfully request that the Examiner approve the proposed changes to Fig. 1. Upon approval of the proposed changes to Fig. 1, Applicants respectfully request that the Examiner accept three (3) sheets of formal

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drawings (Figs. 1-3) also submitted with this Amendment. The formal drawings reflect the changes to Fig. 1 proposed in the Request for Approval of Drawing Change.

The Examiner rejected claims 7-10 and 12 under 35 U.S.C. §102(e) as being anticipated by Li et al. (U.S. Patent No. 6,284,149) and rejected claims 1-6 and 11 under 35 U.S.C. §103(a) as being unpatentable over Li et al. in view of Stinnett (U.S. Patent No. 6,325,861).

Applicants respectfully traverse the rejection under 35 U.S.C. §102(e) because Li et al. fails to disclose all of the elements recited in the claims. In order to properly anticipate Applicants' claimed invention under 35 U.S.C. § 102(e), each and every element of the claim at issue must be found, either expressly described or under principles of inherency, in a single prior art reference. Furthermore, "[t]he identical invention must be shown in as complete detail as is contained in the . . . claim." See M.P.E.P. § 2131 (8th ed. 2001), quoting *Richardson v. Suzuki Motor Co.*, 868 F.2d 1126, 1236, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989). Finally, "[t]he elements must be arranged as required by the claim." M.P.E.P. § 2131 (8th ed. 2001), p. 2100-69.

For example, Li et al. fails to disclose an etching method for etching an etching target film inside an airtight processing chamber by inducing a processing gas into said processing chamber wherein, among other things, "said processing gas contains at least a  $C_xF_y$  gas and  $N_2$ , but does not contain  $O_2$ ," as recited in independent claim 7. As shown in Figs. 5-7, Li et al. discloses an etching process for etching complex structures in carbon-based dielectric materials. Regarding the BCB etch step 54 shown in Fig. 7, Li et al. discloses "using an oxygen-containing gas such as the conventional  $O_2$  as the

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principal etchant for the carbon-based BCB." Col. 9, lines 54-57. Although Li et al. discloses several recipes in Tables 1, 4, 6, and 7, none of these recipes involves a processing gas containing at least a  $C_xF_y$  gas and  $N_2$ , but not  $O_2$ . For at least this reason, Li et al. fails to anticipate independent claim 7.

Applicants also respectfully traverse the rejection under 35 U.S.C. §103(a) because the Examiner has failed to establish a *prima facie* case of obviousness. To establish a *prima facie* case of obviousness under 35 U.S.C. §103(a), each of three requirements must be met. First, the references, taken alone or combined, must teach or suggest each and every element recited in the claims. See M.P.E.P. § 2143.03 (8th ed. 2001). Second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the references in a manner resulting in the claimed invention. Third, a reasonable expectation of success must exist. Moreover, each of these requirements must "be found in the prior art, and not be based on applicant's disclosure." M.P.E.P. § 2143 (8th ed. 2001).

For example, neither Li et al. nor Stinnett discloses or suggests an etching method for etching an etching target film inside an airtight processing chamber by inducing a processing gas into said processing chamber wherein, among other things, "said processing gas contains at least a  $C_xF_y$  gas and  $N_2$ , but does not contain  $O_2$ ," as recited in independent claim 1. As explained above, Li et al. fails to disclose or suggest at least this recited processing gas. Likewise, Stinnett also fails to disclose or suggest at least this recited processing gas. Stinnett discloses an etchant gas composition

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comprising "fluorocarbon gas . . . oxygen gas . . . , and nitrogen-containing gas." Col. 4 line 67 through col. 5, line 6. Stinnett further discloses that the etchant gas preferably comprises CF<sub>4</sub>, O<sub>2</sub>, and N<sub>2</sub>. See col. 5, lines 8-12. Stinnett, however, fails to disclose or suggest a processing gas containing at least a C<sub>x</sub>F<sub>y</sub> gas and N<sub>2</sub>, but not O<sub>2</sub>.

For at least this reason, the Examiner has failed to establish a *prima facie* case of obviousness regarding the subject matter of independent claim 1.

Accordingly, independent claims 1 and 7 are in condition for allowance. Claims 2-5, 8-11, and 13-16 are also in condition for allowance at least by virtue of their dependency from respective allowable independent claims.

In view of the foregoing, Applicants respectfully request the reconsideration and reexamination of this application and the timely allowance of the pending claims.

Attached hereto is a marked-up version of the changes made to the specification and claims by this Amendment. The attachment is captioned "**APPENDIX TO AMENDMENT OF MARCH 18, 2003.**" Deletions appear as normal text surrounded by [ ] and additions appear as underlined text.

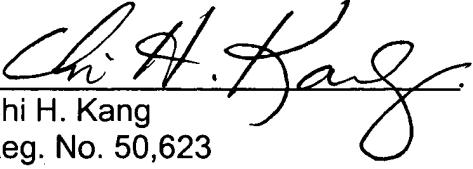
Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,  
GARRETT & DUNNER, L.L.P.

Dated: March 18, 2003

By:

  
Chi H. Kang  
Reg. No. 50,623

**APPENDIX TO AMENDMENT OF MARCH 18, 2003**

**Amendments to the Specification:**

Page 2, the paragraph beginning with "In order to":

(Amended) In order to achieve the object described above, in a first aspect of the present invention, an etching method for etching an etching target film formed on a substrate placed inside an airtight processing chamber by inducing a processing gas into the processing chamber, in which the processing gas contains at least[,] CF<sub>4</sub> and N<sub>2</sub> and the etching target film is constituted of an upper organic film containing Si and a lower SiO<sub>2</sub> film [as disclosed in claim 1], is provided. It is to be noted that [as disclosed in claim 5,] the processing gas may further contain Ar.

Page 2, the paragraph beginning with "The organic film" and bridging pages 2 and 3:

(Amended) The organic film containing Si (the upper layer film) may be constituted of SiO<sub>2</sub> containing C and H, for instance[, as disclosed in claim 2]. In addition, the dielectric constant of the organic film containing Si may be set equal to or lower than 3.0, for instance[, as disclosed in claim 3]. The organic film containing Si may be constituted of organic polysiloxane, for instance[, as disclosed in claim 4].

Organic polysiloxane as referred to in this context is a substance having an SiO<sub>2</sub> bond structure containing a functional group that, in turn, contains C and H, as expressed in the following chemical formula. It is to be noted that in the following chemical formula, the letter R indicates an alkyl group such as a methyl group, an ethyl group or a propyl

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group or an alkyl group derivative or an allyl group such as a phenyl group or its derivative.

Page 3, the paragraph beginning with "In addition" and bridging pages 3 and 4:

(Amended) In addition, if the flow rate ratio of CF<sub>4</sub> and N<sub>2</sub> (N<sub>2</sub> flow rate / CF<sub>4</sub> flow rate) in the processing gas is less than 1, an etching stop occurs and, as a result, deep etching cannot be achieved. If, on the other hand, (N<sub>2</sub> flow rate / CF<sub>4</sub> flow rate) is larger than 4, bowing tends to occur readily and thus, a good etching shape is not achieved. Accordingly, [as disclosed in claim 6,] it is desirable to set the [floor] flow rate ratio of CF<sub>4</sub> and N<sub>2</sub> in the processing gas essentially within a range of 1 ≤ (N<sub>2</sub> flow rate / CF<sub>4</sub> flow rate) ≤ 4.

Page 4, the paragraph beginning with "Furthermore":

(Amended) Furthermore, in order to achieve the object described above, in a second aspect of the present invention, an etching method for etching an etching target film formed on a substrate placed inside an airtight processing chamber by inducing a processing gas into the processing chamber, in which the processing gas contains[,] at

least[,] C<sub>4</sub>F<sub>8</sub> and N<sub>2</sub> and the etching target film is constituted of an upper organic film containing Si and a lower SiN film [as disclosed in claim 7], is provided.

Page 4, the paragraph beginning with "The organic film":

(Amended) The organic film containing Si (the upper layer film) may be constituted of SiO<sub>2</sub> containing C and H, for instance[, as disclosed in claim 8]. In addition, the dielectric constant of the organic film containing Si may be set equal to or lower than 3.0, for instance[, as disclosed in claim 9]. The organic film containing Si may be constituted of organic polysiloxane, for instance[, as disclosed in claim 10].

Page 4, the paragraph beginning with "When":

(Amended) When the lower layer of the etching target film is constituted of an SiN film, a better selection ratio is achieved by using a mixed gas containing C<sub>4</sub>F<sub>8</sub> and N<sub>2</sub> as described above or by using a mixed gas containing C<sub>4</sub>F<sub>8</sub>, N<sub>2</sub> and Ar [as disclosed in claim 11], rather than by using a mixed gas containing CF<sub>4</sub> and N<sub>2</sub> or a mixed gas containing CF<sub>4</sub>, N<sub>2</sub> and Ar.

Page 4, the paragraph beginning with "In addition":

In addition, if the flow rate ratio of C<sub>4</sub>F<sub>8</sub> and N<sub>2</sub> (N<sub>2</sub> flow rate / C<sub>4</sub>F<sub>8</sub> flow rate) in the processing gas is less than 10, an etching stop occurs and, as a result, deep etching is not achieved. Accordingly, it is desirable to set the flow rate ratio of C<sub>4</sub>F<sub>8</sub> and

N<sub>2</sub> in the processing gas essentially within a range of 10 ≤ (N<sub>2</sub> flow rate / C<sub>4</sub>F<sub>8</sub> flow rate) [as disclosed in claim 12].

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**Amendments to the Claims:**

1. (Amended) An etching method for etching an etching target film formed on a substrate placed inside an airtight processing chamber by inducing a processing gas into said processing chamber, wherein;

    said processing gas contains[,] at least[, CF<sub>4</sub>] a C<sub>x</sub>F<sub>y</sub> gas and N<sub>2</sub>, but does not contain O<sub>2</sub>; and

    said etching target film is constituted of an upper organic film containing Si and a lower SiO<sub>2</sub> film.

7. (Amended) An etching method for etching an etching target film formed on a substrate placed inside an airtight processing chamber by inducing a processing gas into said processing chamber, wherein;

    said processing gas contains[,] at least [C<sub>4</sub>F<sub>8</sub>] a C<sub>x</sub>F<sub>y</sub> gas and N<sub>2</sub>, but does not contain O<sub>2</sub>; and

    said etching target film is constituted of an upper organic film containing Si and a lower SiN film.

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